

2008 Inspection and Annual Site Status Report for the Site A/Plot M, Cook County, Illinois Decontamination and Decommissioning Program Site

Summary

Site A/Plot M was inspected on April 25, 2008. The site, located within a county forest preserve with significant tree and grass cover, is in good condition. No cause for a follow-up inspection was identified.

The historic monument at Plot M has been vandalized, as noted during previous inspections, but remains functional.

Argonne National Laboratory (ANL) is in the process of decommissioning several monitor wells, and will provide a list and decommissioning documentation of the decommissioned monitor wells to DOE-LM.

The need to label the outer surface of the protective casing of monitor wells with a well number was discussed and ANL agreed to label the wells during the next sampling event. One monitor well was found to be unlocked at Site A, and one damaged at Plot M. ANL is in the process of addressing both issues.

Erosion along footpaths on top of Plot M appears to be worsening. Repairing the erosion is on hold until upcoming work to decommission area monitor wells is complete.

Tritium and strontium-90 contamination remains in groundwater, and tritium remains in surface water, with concentrations generally on a downward trend consistent with previous results.

1.0 Introduction

This report presents the findings of environmental monitoring and the annual U.S. Department of Energy (DOE) Office of Legacy Management (LM) inspection of Site A/Plot M at the Palos Forest Preserve in Cook County, Illinois. Features and photograph locations (PLs) discussed in this report are shown on the attached figure.

The following points describe the site:

1. Site A contains two buried nuclear reactor shells and buried debris from the various support buildings associated with the reactors and other laboratory operations. Operations commenced in 1943 and decommissioning was complete by 1956. The site occupies roughly 19 acres. The only structures visible are the stone monument marking the site, occasional concrete flatwork and fence post collars, a section of the original chain link fence, and monitor wells. The site surface, which had been cleared and used as a golf course before World War II, is returning to hardwood forest. Hydrogen-3 (tritium) and strontium-90 contamination exists in groundwater beneath Site A.

2. Plot M contains a series of trenches that were used to bury radioactive wastes, beginning in 1943. Plot M is less than 1 acre in extent. A granite monument and six boundary monuments mark the site, which consists of a mounded earth cover planted in grass, placed over an inverted concrete box. The concrete structure was constructed in 1956. It is intended to reduce infiltration and lateral movement of soluble contaminants. Tritium contamination in groundwater beneath Plot M is thought to result from a single period of release before the concrete containment was installed.
3. More than 50 wells and boreholes are present at Site A and Plot M. DOE–LM contracts directly with ANL for all environmental sampling, analysis, and reporting. Environmental monitoring reports are issued annually by ANL. ANL is in the process of awarding a contract to decommission 26 of the wells that are no longer used in the monitoring effort. ANL personnel will provide DOE–LM with a list and decommission documentation of the monitor wells that will be abandoned.
4. In 2003 and 2004, DOE and S.M. Stoller staff from the DOE office in Grand Junction, Colorado, worked with representatives of the DOE Chicago Operations Office, ANL, and the Illinois Emergency Management Agency (IEMA) to evaluate groundwater and surface water conditions and the current monitoring program. The evaluation demonstrated that contaminant levels are diminishing, and the lateral and vertical extent of contamination has not increased. The monitoring program was revised, as described in the *Environmental Monitoring Program at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois* (GJO-2004-558-TAC, February 2004). The new program entails quarterly sampling at 36 surface and groundwater locations.
5. The *Long-Term Surveillance and Maintenance Plan for Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*, (DOE–LM/GJ704–2004, December 2004) incorporates the modified monitoring program.
6. In 2005, DOE–LM incorporated monitoring data from the ANL database into the DOE–LM database. The monitoring results are available on the DOE–LM public website at <http://www.lm.doe.gov/land/sites/il/sitea/sitea.htm>.

2.0 Inspection Results

M. Miller (Chief Inspector) and R.C. Ransbottom and K. Broberg (Assistant Inspectors) all of S.M. Stoller Corporation, the Legacy Management (LM) contractor, conducted the inspection on April 25, 2008. N. Golchert and A. Fracaro of ANL participated. Mr. Golchert is the lead for the monitoring services for Site A/Plot M. Mr. Fracaro is the lead sampler. Lawrence Haskell of IEMA also participated in the inspection. IEMA does not have regulatory authority over DOE at Site A/Plot M but is informed of and consulted with on long-term surveillance and maintenance activities that DOE conducts at Site A/Plot M.

The inspection was conducted in accordance with the *Long-Term Surveillance and Maintenance Plan for Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*. The purposes of the inspection were to look for evidence that the integrity of the disposal facility is not threatened, to evaluate the condition of the monuments, to determine if maintenance is needed, and to examine the condition of DOE monitor wells.

Inspectors met at the Red Gate Woods parking area and discussed some of the history of the site. The inspectors noted that the pump handles remained off the picnic wells and that a portable restroom was in place. The handles were removed from the pump to prevent exposure to tritium detected in the dolomite aquifer as well as fecal coliform detected in the groundwater. The fecal coliform originated from a nearby permanent restroom facility, which was removed and replaced with the observed portable restroom.

Site A

Inspectors drove to Site A, walked to the center of the area, and examined the historical monument (PL-1) and the monitor wells. The Site A historical monument was in good shape.

Inspectors walked the perimeter roads of Site A, inspecting monitor wells and observing the general condition of the site. With the exception of monitor well DH1, monitor wells were secured with locks. The lock at monitor well DH1 was missing (PL-2). ANL personnel, aware of the missing lock, were in the process of replacing it. The protective casings of the monitor wells at Site A were not clearly identified with a well number (PL-3). ANL personnel indicated that they would properly label the wells, including the flush mount wells (PL-4). No monitor wells were opened during the inspection. ANL personnel visit the wells quarterly for sampling, ensure well security, and perform required maintenance at that time. The attached drawing depicts most of the active monitor well locations for Site A/Plot M, as established with a global positioning system unit in 1999.

The lower portion of the access road to Site A (near the Archer Avenue turn-off) continues to narrow due to overgrowth from bushes and sapling trees. This is not an issue as long as the road remains passable and the encroaching vegetation is immature and pliable. Eventually, however, the vegetation will become woody and will impede access or cause vehicle damage. ANL personnel are aware of the situation and will periodically request the Palos Forest Preserve District to control the encroaching vegetation.

Plot M

Inspectors drove from Site A to an area leading back to Plot M, and then walked back to Plot M. Minor vandalism was observed on the Plot M historic marker (PL-5). It was noted that the corner markers for Plot M were not identified on the inspection drawing. The corner markers have been added to the detail for Plot M provided in the attached inspection drawing.

Erosion observed along footpaths that cross over the top of Plot M appears to be worsening (PL-6). Efforts to repair the erosion have been put on hold pending the upcoming abandonment of several monitor wells in the area. ANL personnel believe that the heavy equipment needed to abandon the wells would adversely impact the erosion repairs if they were done first. A request was made that ANL provide DOE-LM with well decommissioning information for Plot M wells that are abandoned.

The protective casings of the monitor wells at Plot M were not clearly identified with a well number. A request was made that ANL label the protective casings of the Plot M wells. One monitor well at Plot M was heavily damaged (PL-7). ANL personnel identified the damaged well as either BH-11A or BH-11B, but without identification on the well casing it was hard to determine the exact well ID in the field. Although it is hard to see in photo PL-7, a third well is

located between the two green protective casings seen in the picture. The outer metal casing can be seen protruding from the ground surface. The protective casing is completely missing, and the PVC riser inside the outer well casing is not secured. The ability to sample the well has not been compromised by the vandalism. ANL personnel were aware of the damaged well at the time of the inspection and were in the process of having the well repaired. They reported that someone had recently vandalized the well by removing the protective casing. ANL personnel never found the protective casing that had been removed.

3.0 Monitoring Results

ANL collects water samples quarterly in accordance with the *Environmental Monitoring Program at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*. All samples are analyzed for tritium. Samples from monitoring locations near historic occurrences of strontium-90 are analyzed for that radionuclide, as well. Monitoring results are compiled in *Surveillance of Site A and Plot M, Report for 2007* (ANL-08/04, April 2008) which will be available to the public on the LM website. Monitoring results for 2007 are summarized below.

3.1. Surface Water

An intermittent stream flows past Plot M and a seep issues from the stream bank adjacent to the historic burial area. The stream was dry for the entire fourth quarter of 2007.

In 2007, tritium levels in the intermittent stream were below the State of Illinois standard of 20 nanocuries per liter (nCi/L), or 20,000 picocuries per liter (pCi/L). Seep activities (Location 0006) ranged from 6.8 nCi/L to 33.8 nCi/L (Figure 1).

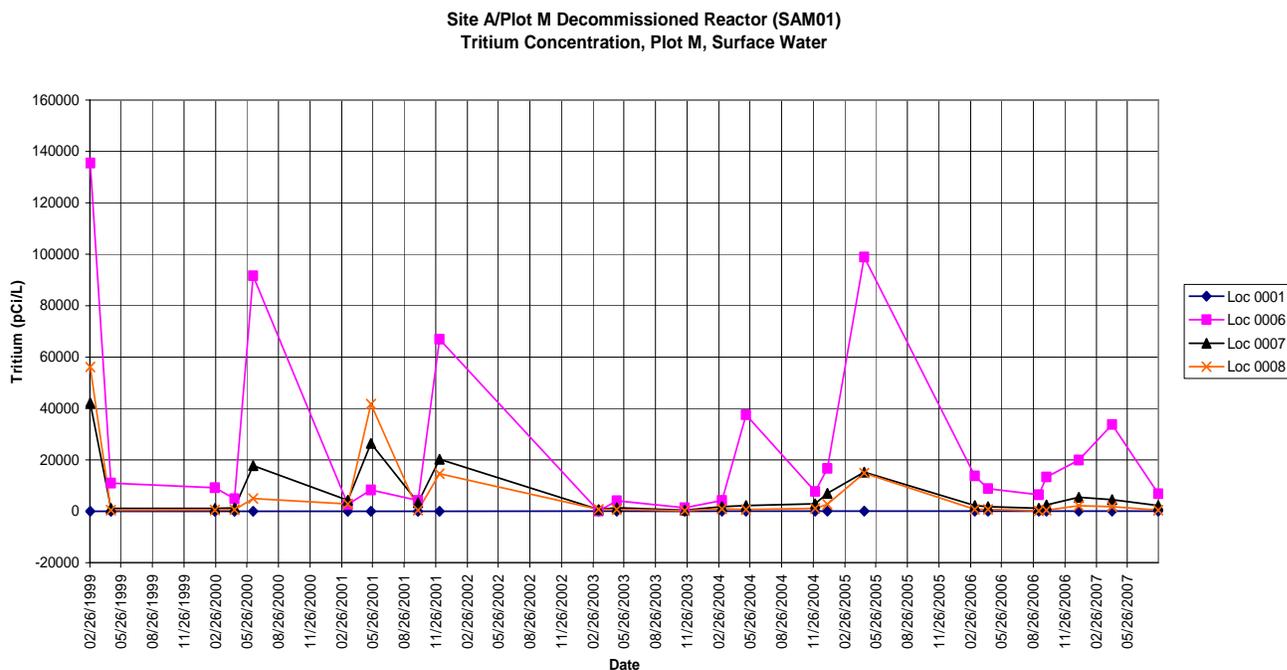


Figure 1. Tritium Activities in Surface Water at Site A/Plot M, Cook County, Illinois

Quarterly surface water samples collected from five area ponds in 2007 (NW Site A, SE Site A, Bull Frog Lake, Horse Collar Slough, and Tomahawk Slough) ranged from non detect (< 0.1 nCi/L) to 0.13 nCi/L.

3.2. Groundwater—Glacial Drift

In 2007, tritium was detected in the groundwater at four of six Site A monitor well locations completed in the glacial drift. None exceeded the standard of 20 nCi/L. Activities continue to decrease and ranged from non-detect (less than 0.1 nCi/L) to 3.6 nCi/L (Figure 2).

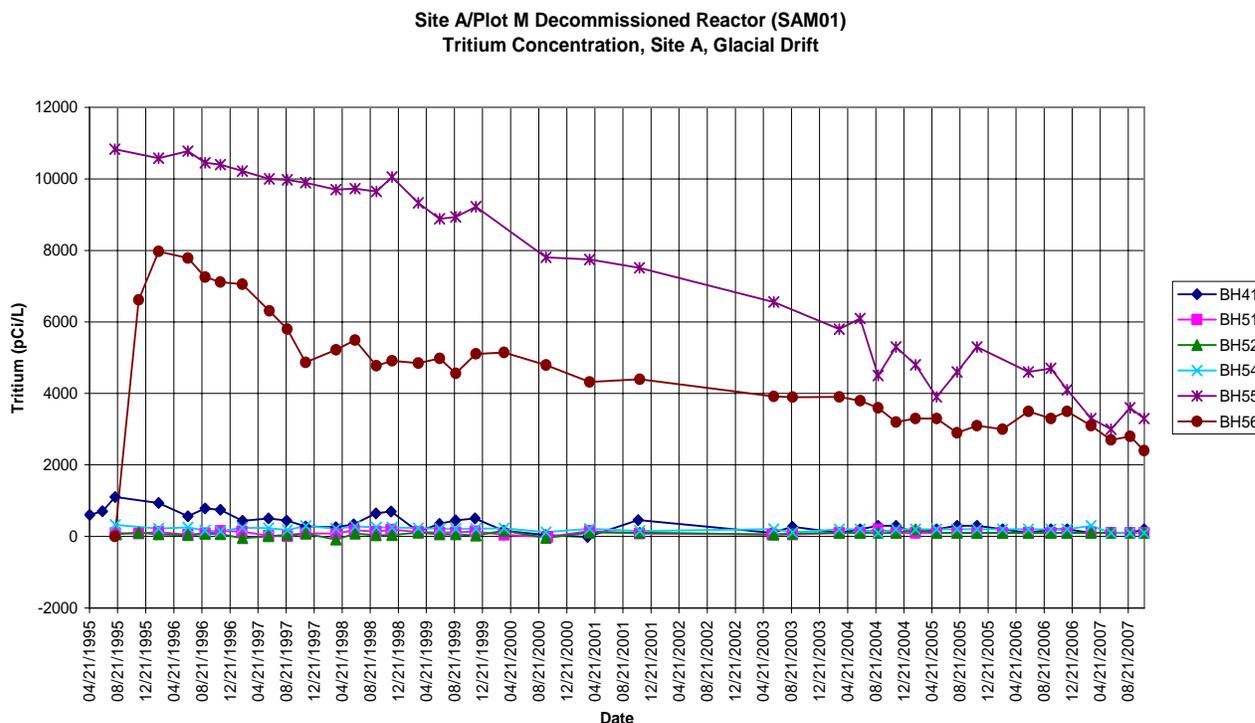


Figure 2. Tritium Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2007, strontium-90 was detected in groundwater at two of six Site A monitor well locations. Activities ranged from non-detect (less than 0.25 pCi/L) to 3.70 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L (Figure 3).

Site A/Plot M Decommissioned Reactor (SAM01)
Strontium-90 Concentration, Site A, Glacial Drift

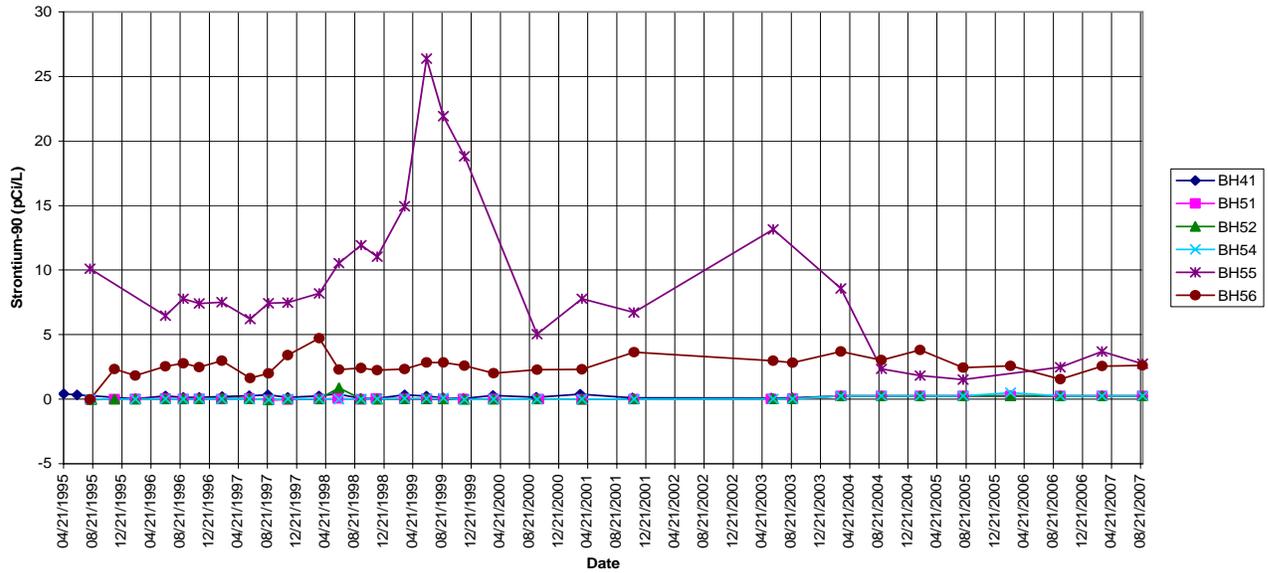


Figure 3. Strontium-90 Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2007, at Plot M, tritium was detected in groundwater at all nine monitor wells completed in the glacial drift. Tritium concentrations ranged from 1.5 to 1,462 nCi/L (Figure 4). The highest reading was taken at BH9 on March 12, 2007. BH-9 was dry for the remainder of 2007.

Site A/Plot M Decommissioned Reactor (SAM01)
Tritium Concentration, Plot M, Glacial Drift

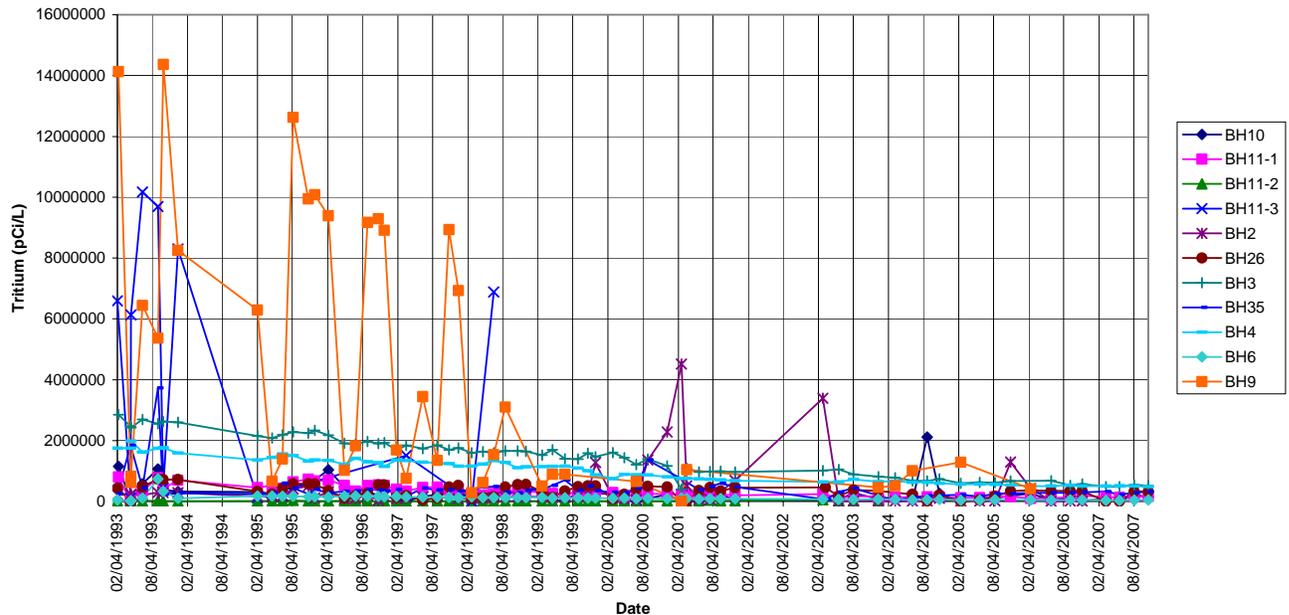


Figure 4. Tritium Activities in Groundwater in the Glacial Drift at Plot M, Cook County, Illinois

In 2007, strontium-90 occurred above the detection level in the groundwater at Plot M wells BH2, BH6, BH11, and BH26. Five other wells were below detection limits. Activities ranged from non-detect (less than 0.25 pCi/L) to 2.70 pCi/L. No strontium-90 activities exceeded the standard 8 pCi/L.

3.3. Groundwater—Dolomite Bedrock

In 2007, tritium was detected in the groundwater at the picnic wells at the Red Gate Woods picnic area. Activities ranged from 0.17 to 1.45 nCi/L (Figure 5). None exceeded the standard of 20 nCi/L.

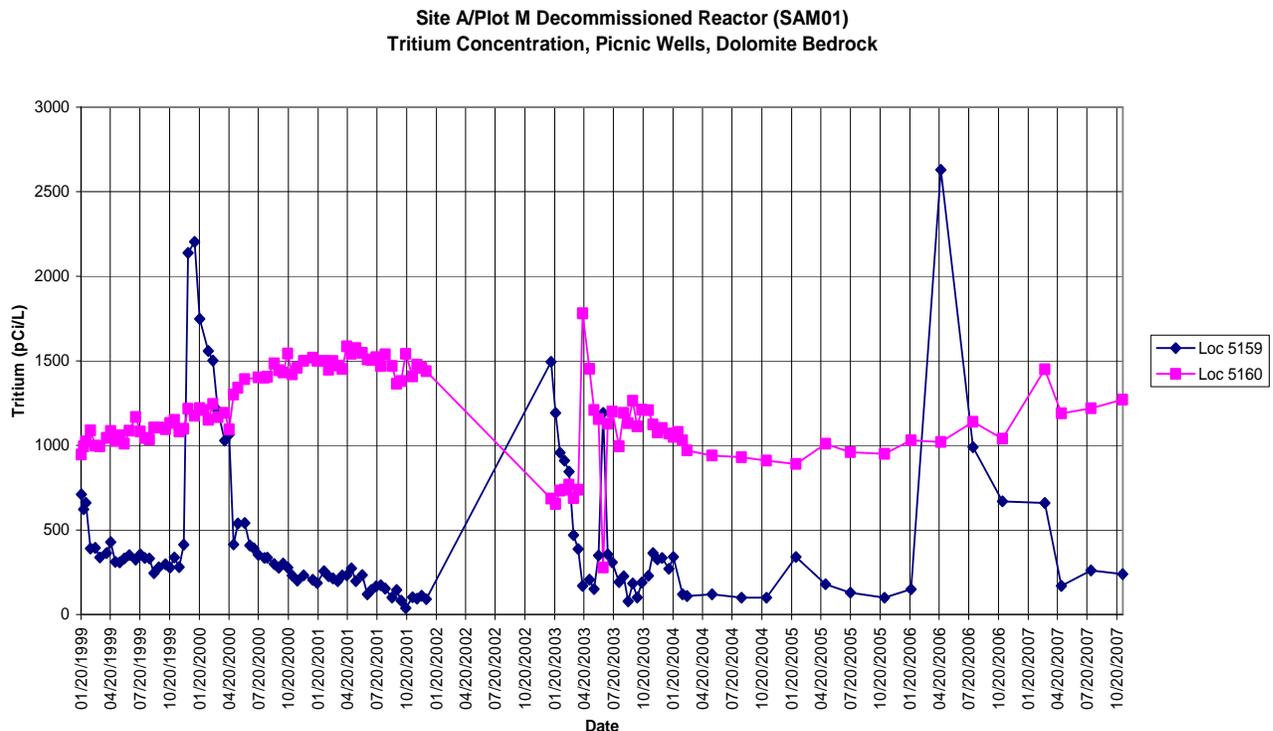


Figure 5. Tritium Activities in Groundwater in the Picnic Wells, Site A/Plot M, Cook County, Illinois

In 2007, tritium activities were detected in groundwater at all ten sampling locations intercepting the dolomite bedrock at Plot M and ranged from 0.2 to 2.5 nCi/L. Activities of tritium continue to decrease (Figure 6). Tritium was not detected in the dolomite bedrock beneath Site A and these monitoring locations were eliminated in 2004 after approximately 30 years of sampling.

Site A/Plot M Decommissioned Reactor (SAM01)
Tritium Concentration, Plot M, Dolomite Bedrock

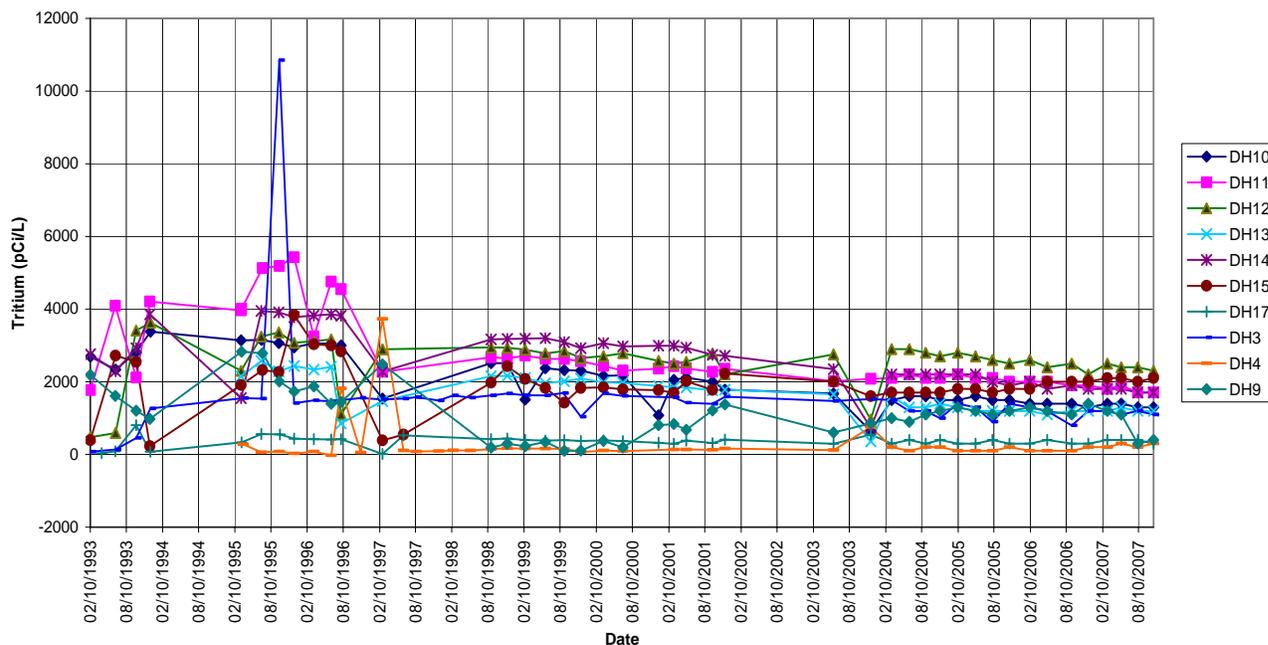


Figure 6. Tritium Activities in Groundwater in the Dolomite Bedrock, Site A/Plot M, Cook County, Illinois

3.4. Risk Assessment

All exposure pathways to contaminated groundwater are incomplete (handles have been removed from the picnic wells because of fecal coliform contamination and the groundwater beneath Site A/Plot M is not used for any purpose). The seep and stream flow in the spring does not pose a risk to human health or the environment because of low volume and intermittent flow (see the risk assessment summary in *Evaluation and Recommendation for Environmental Monitoring at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois, GJO-2003-462-TAC, August 2003*).

4.0 Recommendations

1. ANL is in the process of decommissioning several monitor wells (page 1).

Recommendation: ANL will provide DOE–LM with a list and decommissioning documentation of the monitor wells that will be abandoned.

2. No lock was present on monitor well DH1 (page 3).

Recommendation: ANL will provide a new lock for well DH1.

3. Protective casings of monitor wells are not identified with well numbers (page 3).

Recommendation: ANL will label protective casings of monitor wells with well numbers.

4. Erosion continues to impact the footpaths crossing Plot M (page 3).

Recommendation: Enough traffic passes over these paths to preclude successfully repairing the erosion by filling the depressions with soil and reseeded. A soil/rock mixture also failed to stabilize the trails. DOE and ANL will consider retaining a landscaping contractor to implement a more effective repair once upcoming well decommissioning activities in the area have been completed.

5. Vegetation encroaches on the access road (page 3).

Recommendation: The Palos Forest Preserve District will be contacted about controlling the encroaching vegetation as needed to prevent trees from impeding access to the site.

6. Monitor well at Plot M found to be damaged. Protective casing was missing, and PVC riser is not secured. The ability to sample this well has not been compromised by the vandalism.

Recommendation: This damaged well needs to be repaired or plugged and abandoned. ANL is currently in the process of addressing this well.

5.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	90	Site A Historic Marker.
PL-2	225	Monitor well DH1.
PL-3	135	Monitor well BH55.
PL-4	NA	Monitor well DH18.
PL-5	30	Plot M Historic Marker.
PL-6	180	Erosion on top of Plot M.
PL-7	135	Monitor well 11.

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SAM 4/2008. PL-1. Site A Historic Marker.



SAM 4/2008. PL-2. Monitor well DH1.



SAM 4/2008. PL-3. Monitor well BH55.



SAM 4/2008. PL-4. Monitor well DH18.



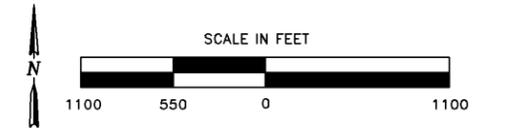
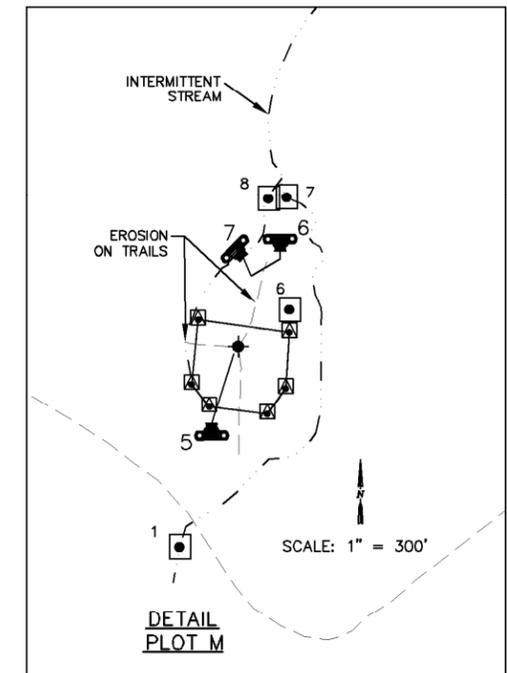
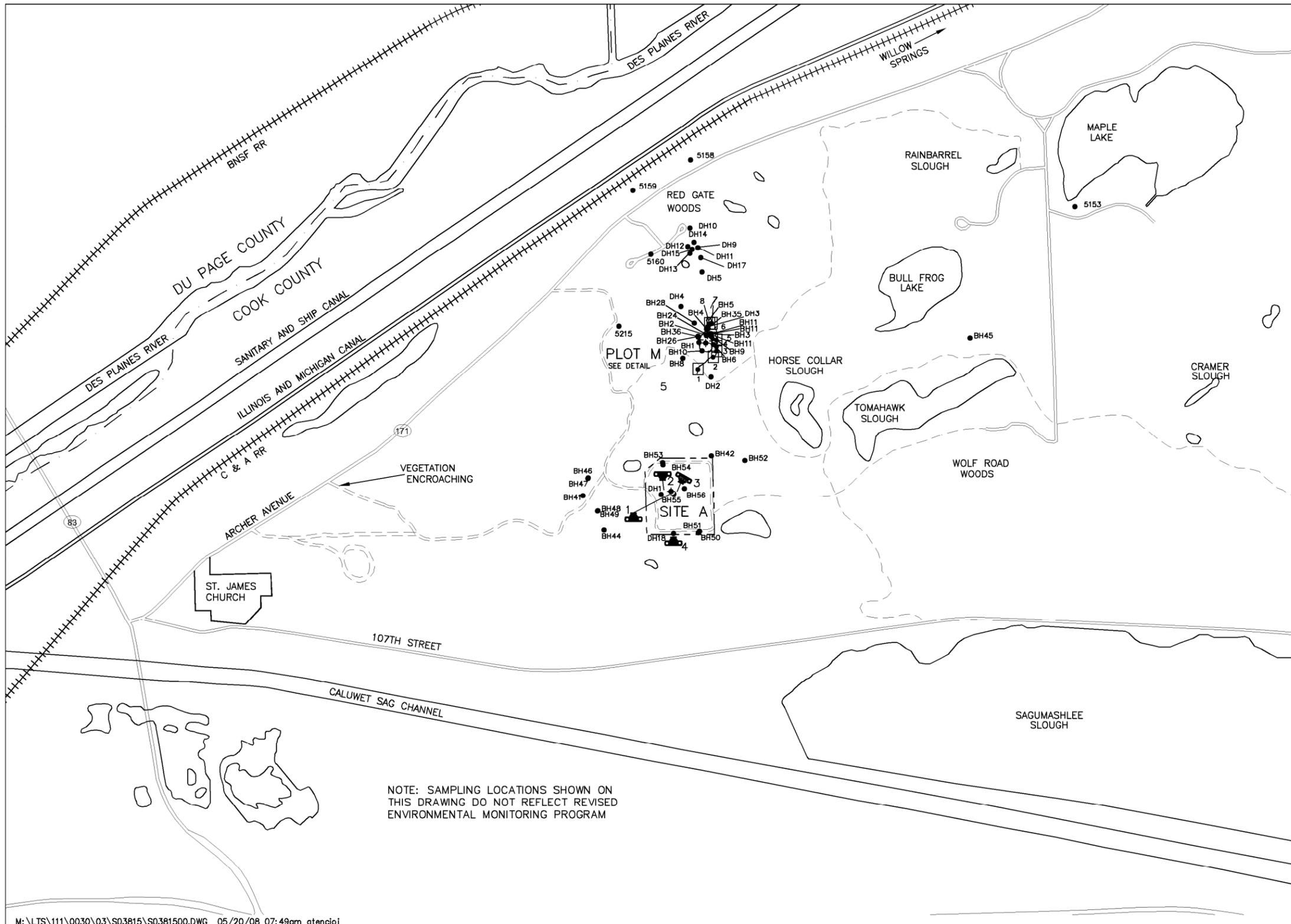
SAM 4/2008. PL-5. Plot M Historic Marker.



SAM 4/2008. PL-6. Erosion on top of Plot M.



SAM 4/2008. PL-7. Monitor well 11.



EXPLANATION

	CORNER MARKER
	5153 PICNIC WELL
	DH2 DOLOMITE WELL
	BH28 BOREHOLE
	5 SURFACE SAMPLE LOCATION
	SITE MARKER
	SITE BOUNDARY
	DIRT ROAD
	PAVED HIGHWAY OR STREET
	NON-MOTORIZED TRAIL
	RAILROAD
	RIVER, CANAL, LAKE, POND, SLOUGH
	COUNTY LINE
	1 PHOTO LOCATION, ROTATION, AND NUMBER

ANNUAL INSPECTION CONDUCTED
APRIL 25, 2008

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AC01-07LM00060
2008 ANNUAL INSPECTION DRAWING SITE A/PLOT M DECOMMISSIONED REACTOR COOK COUNTY, ILLINOIS	
DATE PREPARED: MAY 9, 2008	FILENAME: S0381500